We will use mathematical induction to prove the following familiar proposition of Euclidean geometry:

Proposition For $n \geq 3$, the sum of the measure of the interior angles of a convex polygon with n vertices is $(n-2)\pi$ radians.

Proof: We will proceed by induction.

Base Case ($n = 3$): A (convex) polygon with 3 vertices is just a triangle. We know that the sum of the measures of the angles in a triangle is $\pi = (3-2)\pi$ radians. Thus our proposition holds for $n = 3$.

Inductive Step: Fix some $n \geq 3$ and assume the the proposition holds for this n. Then consider a convex polygon with $n+1$ vertices. We provide a figure below:

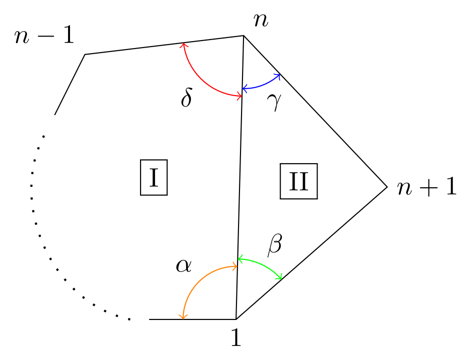

Figure: Our convex polygon with $n+1$ vertices.

As done in the above figure, draw a line segment between vertex 1 and vertex n. Since the polygon is convex, this segment will lie *inside* the polygon. We now have two convex polygons made coming from our original convex polygon. Let us label the polygon with vertices 1 through n as $\boxed{\text{I}}$ and the polygon with vertices n, $n+1$, and 1 as $\boxed{\text{II}}$.

By our inductive hypothesis the sum of the measures of the angles of polygon $\boxed{\text{I}}$ is $(n-2)\pi$ radians. On the other hand, polygon $\boxed{\text{II}}$ is a triangle, so its angles sum to π radians.

Notice that the measure of the angle at vertex n in our original $(n+1)$ vertex polygon is the sum of the angles at vertex n in polygon $\boxed{\text{I}}$ and polygon $\boxed{\text{II}}$ (i.e., the angle at n is $\delta + \gamma$). Likewise, the measure of the angle at vertex 1 in our original polygon is the sum of the angles of polygons $\boxed{\text{I}}$ and $\boxed{\text{II}}$ at vertex 1 (i.e., the angle at 1 is $\alpha + \beta$).

The measures of the angles in our original polygon at vertices 2 through $n-1$ are the same as those in polygon $\boxed{\text{I}}$. Likewise, the measure of the angle at vertex $n+1$ is the same in our original polygon as it is the the triangle $\boxed{\text{II}}$.

Thus the sum of the measures of the angles at the vertices of our original polygon is equal to the sum of the angles of polygons $\boxed{\text{I}}$ plus the sum of the angles of our triangle $\boxed{\text{II}}$. Therefore, the sum of the measures of the angles of our original polygon is $(n-2)\pi + \pi = (n-1)\pi = ((n+1)-2)\pi$ radians.

We have just shown that if the proposition holds for convex polygons with n vertices, then it must also hold for convex polygons with $n+1$ vertices.

Therefore, by induction our proposition holds for all $n \geq 3$. ■